UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/527,347	03/10/2005	Derek John Fray	R & G-106	7234

23557 7590 04/17/2008

SALIWANCHIK LLOYD & SALIWANCHIK
A PROFESSIONAL ASSOCIATION
PO BOX 142950
GAINESVILLE, FL 32614-2950

EXAMINER	
SALZMAN, KOURTNEY R	
ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
04/17/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/527,347	FRAY ET AL.	
	Examiner	Art Unit	
	KOURTNEY R. SALZMAN	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 March 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *August 8, 2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Summary

1. This is the first Office action on the merits on national phase 371 application 10/528,187 entitled Apparatus and Method for Measuring Reaction Results of Samples on Biosensor filed March 17, 2005. This is the national phase application for PCT/KR02/01853 filed 10/04/2002, which claims priority from Korean document 2002/59612, filed 9/30/2002.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 15 and 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Claims 15 and 16 recite the limitation "sealing material" in the second line of claim 15. There is insufficient antecedent basis for this limitation in the claim.

6. For the purpose of this office action, the examiner has interpreted claim 15 to be dependent upon claims 1 and 13, which identifies a sealing material, and claim 16, to be dependent upon claims 1, 13 and 15.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1, 4, 7, 19 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by ALBERTI et al (US 5,453,172)

ALBERTI et al teaches a sensor for determining a concentration of hydrogen gas (abstract) comprising a protonic solid electrolyte, reference number 1, and a solid state reference electrode, containing metal and hydrogen (titanium hydride), reference number 3, in figure 1, shown to be in contact. The electrode is prepared in a hydrogen environment (c. 3, l. 51-53) and, as shown in example 8, is shown to have a constant partial pressure, making the electrode stable (claim 7).

The reference electrode is shown to be a zirconium or titanium hydride, as required by claim 4. (c. 3, l. 12-14)

Regarding claims 19 and 20, ALBERTI et al teaches the use of gas mixtures with high humidity levels (c. 6, l. 44-46) with minimal hydrogen content, for example the use of air, which contains minimal amounts of hydrogen (c. 5, l. 42-44). ALBERTI et al also discloses the treatment of the sensor in the temperature range of 400 - 700 ° C, for 2 or more hours. (c. 3, l. 50-53)

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 2, 3, 8-10 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over ALBERTI et al (US 5,453,172), in view of KIODE et al (US 5,445,725).

ALBERTI et al discloses all the limitations of claim 1, including a protonic conductor, which "is known in technical literature" is applicable. (c. 3, l. 19-23)

ALBERTI et al teaches a few examples, but fails to disclose a specifically preferable material.

KIODE et al discloses the use of a proton conducting doped strontium cerate and calcium zirconate as the perovskite structured proton conductive solid electrolyte in the hydrogen sensor, in the column 6, lines 13-16. This membrane is specifically referred to as a "perovskite", as required by claim 2.

At the time of invention, it would have been obvious to one of ordinary skill in the art to use the doped strontium proton conductor as disclosed in KOIDE et al as the proton conductor of ALBERTI et al because the substitution of one known proton conductor for another yields a predictable result, as it is used for the same purpose in both sensors.

Regarding claims 8-10, ALBERTI et al teaches the operating conditions for establishment of the solid electrolyte to be between 400 and 700 ° C.

KOIDE et al teaches the use of a molten electrode in column 1, lines 54-68, which degrades the electrolyte layer over time. However, the reaction of the

molten liquid with the electrolyte also establishes an oxide layer in the temperature range of 400 to 1100 ° C. Since the electrolyte of ALBERTI et al is used in its solid form, the degradation would not continue. This allows for the formation of the layer without the continued degradation. At the time of invention, it would be obvious to form the oxygen rich layer, as described by the heating of KOIDE et al during the creation of the electrode as described in ALBERTI et al because due to the environmental conditions use to create the electrode, the oxide layer would form naturally in the presence of air.

Regarding claim 13, KOIDE et al discloses the use of a glass sealing material for use to keep the sensor gas tight as disclosed in column 6, lines 53-57.

13. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over ALBERTI et al (US 5,453,172) as applied to claim 1 above, as evidenced by WETCH et al (US 4,127,443).

ALBERTI et al teaches all the limitations of claim 1, including the use of zirconium hydride as the reference standard of the instant application. ALBERTI et al also teaches the use of different phases, or α-phase zirconium hydrogen layers, in the sensor. (Claim 1) ALBERTI et al also teaches the treatment of the electrode to occur anywhere from 400 - 700 ° C (c.3, l. 50-53), more specifically showing example 8 which treats the electrode at 650 ° C. (c. 6, l. 15-23)

ALBERTI et al fails to explicitly teach the presence of the two states in the metal hydrogen standard.

Treatment of the electrode material of zirconium hydride at 650 ° C according to the phase diagram present as figure 4 of WETCH et al can be found to cause α and β zirconium hydride or β and δ zirconium hydride to be present. The manipulation of the atom percent or atomic ratios at this temperature can cause, without undue experimentation, the formulation of either phase set. Nearly all atomic ratio or atom percent of hydrogen, at 650 ° C, will cause the formation of a two-phase reference, making it obvious to that at the operating conditions disclosed in ALBERTI et al, the a two phase electrode will be present, evidenced by WETCH et al.

14. Claims 11, 12, 18, 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over ALBERTI et al (US 5,453,172) as applied to claim 1 above, and further in view of TIWARI (US 4,882,032).

ALBERTI et al teaches all the limitations of claim 1. ALBERTI et al fails to disclose a metal coating on the electrode.

Regarding claims 11 and 12, TIWARI discloses a metal coating surrounding the hydrogen electrode in column 2, lines 24-29, made of platinum (claim 12 of the instant application).

At the time of invention it would have been obvious to one of ordinary skill in the art to use a metal coating, as in TIWARI, on the electrode, as disclosed in ALBERTI et al, because TIWARI teaches it to "catalyze the hydrogen exchange reaction" (c. 2, l. 24-26), making the sensor reaction occur faster, for quicker results. Increasing time of processing is a well known industry goal.

Regarding claim 18, TIWARI discloses a chamber full of hydrogen gas which is diffused into the melt or heated metal. (c. 1 l. 67- c. 2 l. 24) The chamber is closed to contain the gas.

Regarding claim 21, ALBERTI et al teaches all the apparatus pieces including a protonic solid electrolyte, reference number 1, and a solid state reference electrode, containing metal and hydrogen (titanium hydride), reference number 3, in figure 1, shown to be in contact. The electrode is prepared in a hydrogen environment (c. 3, l. 51-53).

ALBERTI fails to disclose the method of using the sensor.

TIWARI discloses the method of operation for a sensor containing similar pieces to that of ALBERTI including electrolyte contacting the membrane and the

monitoring of the electricity from the counterelectrode to the hydrogen reference electrode in column 2, lines 9-23.

At the time of invention it would have been obvious to one of ordinary skill to combine the structural pieces disclosed in ALBERTI et al with the method disclosed in TIWARI because the method of using the sensor as disclosed in TIWARI seeks to provide a more effective and longer lasting hydrogen sensor, a common goal in the art. (TIWARI (c. 1, l. 32-34))

Regarding claim 23, ALBERTI et al teaches all the apparatus pieces including a protonic solid electrolyte, reference number 1, and a solid state reference electrode, containing metal and hydrogen (titanium hydride), reference number 3, in figure 1, shown to be in contact. The electrode is prepared in a hydrogen environment (c. 3, l. 51-53).

ALBERTI et al fails to teach the sealing of the electrode while in the presence of the hydrogen gas.

TIWARI discloses a chamber full of hydrogen gas which is diffused into the melt or heated metal. (c. 1 l. 67- c. 2 l. 24) The chamber is closed to contain the gas.

At the time of invention it would have been obvious to one of ordinary skill to combine the structural pieces disclosed in ALBERTI et al with the method disclosed in TIWARI because the method of using the sensor as disclosed in TIWARI seeks to provide a more effective and longer lasting hydrogen sensor, a common goal in the art. (TIWARI (c. 1, l. 32-34))

15. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over ALBERTI et al (US 5,453,172) and KOIDE et al (US 5,445,725) as applied to claim 13 above, as evidenced by FERRO ("Electronic and Specialty Glass: Low Temperature Sealing." Ferro Corporation. 2008. 11 Apr. 2008 <http://www.ferro.com/our+products/electronic/products+and+markets/electronic+and+specialty+glass/low-temperature+sealing.htm>.)

KOIDE et al teaches the use of a glass sealant to create the air-tight sensor of ALBERTI and discloses all the necessary elements of claims 1 and 13.

The combination of KOIDE et al and ALBERTI et al does not teach the use of a specific type of glass.

There are a very large number of low temperature sealant products evidenced by the Ferro Corporation extensive list shown including product EG 2759 which is used with glass substrates like that of the sensor tubing. This sealant, as shown in the information regarding the product, functions as a glass sealant containing no silicon and borate, a boron oxide, with a low temperature. These types of

sealants are very common in the industry and is just one example of those offered by one company.

At the time of invention, it would be obvious to use the sealant of the FERRO company as a substitute for the glass sealant used in the combination of KOIDE et al and ALBERTI et al because the simple substitution of materials which function the same way would create a predictable result of sealing the seams of the sensor.

16. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over ALBERTI et al (US 5,453,172) and KOIDE et al (US 5,445,725) as applied to claim 13 above, and further in view of BODE (US 4,174,258).

KOIDE et al teaches the use of a glass sealant to create the air-tight sensor of ALBERTI and discloses all the necessary elements of claims 1 and 13.

The combination of KOIDE et al and ALBERTI et al does not teach the use of a protective film, or inert packing, within the sensor.

BODE teaches an electrolyte gas sensor which uses a protective means 13. Figure 2 shows the protective means to fill the balance of the sensor. BODE teaches the protective material to contain oxide metals including that of yttrium. (c. 4, l. 4-19) BODE shows the protective member to be a liner or located inside the sensor chamber, therefore between the inside or electrode member of

ALBERTI et al and the sealant disclosed on the outside of the electrode of KOIDE et al.

At the time of invention, it would be obvious to fill the sensor chamber, as disclosed in BODE, in the sensor as disclosed by ALBERTI et al and KOIDE et al because the material is used to maintain a constant partial pressure of gas within the sensor chamber (c. 4, l. 1-3), just as is required by an effective reference electrode through constant partial pressure.

17. Claims 17 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over ALBERTI et al (US 5,453,172) as applied to claim 1 above, and further in view of ZUPANCIC et al (US 4,664,757).

ALBERTI et al teaches all the limitations of claim 1. ALBERTI et al fails to explicitly disclose the specific preferred method of creating the standard within the chamber.

Regarding claims 17 and 22, ZUPANCIC et al teaches the reference to be a piece of metal which is exposed to hydrogen as it flows through the membrane to reach the metal. (c. 11, l. 45-55) ZUPANCIC et al also teaches the sealant of the reference and membrane in figure 4. A closed electrode is formed with a metal hydrogen electrode within.

At the time of invention, it would be obvious to one of ordinary skill in the art to create the electrode of ALBERTI et al using the two step process disclosed in ZUPANCIC et al because there are only a finite number of ways in which the metal hydrogen reference electrode can be contained within a gas tight glass sensor. Since both sensors teach similar electrodes in a gastight chamber, there are only a few ways to combine all pieces and it would not require undue experimentation to determine the optimal assembly method.

Conclusion

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KOURTNEY R. SALZMAN whose telephone number is (571)270-5117. The examiner can normally be reached on Monday to Thursday 6:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nam X Nguyen/
Supervisory Patent Examiner, Art Unit 1753

krs
4/11/2008